à $t_1 = 2.10^{-3}s = \frac{T_0}{4}$

$u_c(t_1) = 12\sin(\frac{2\pi}{T} \times \frac{T}{4} + \varphi_{u_C}) = 6\sqrt{2}V$

$\Rightarrow \sin\left(\frac{\pi}{2} + \varphi_{u_c}\right) = \frac{\sqrt{2}}{2}$

$i = C\frac{dU_C}{dt} < 0 \Rightarrow \cos\left(\frac{\pi}{2} + \varphi_{u_C}\right) < 0$

$\Rightarrow \frac{\pi}{2} + \varphi u_C = \frac{3\pi}{4} \Rightarrow \varphi_{u_C} = \frac{\pi}{4} rad$

c- $i = C\frac{du_C}{dt}$

$\Rightarrow_i = \varphi_{u_C} + \frac{\pi}{2} = \frac{3\pi}{4}$

i(t) en quadrature avance de phase par rapport à $u_c(t)$

d- $i(t) = I_{max} \sin(\omega_0 t_1 + \frac{3\pi}{4}) = 1{,}5\,\pi\sqrt{3}.10^{-3}\,A$

$$I_{max} = \frac{1{,}5\pi\sqrt{2}.10^{-3}}{\sin(\frac{\pi}{2} + \frac{\pi}{4})}$$

* $I_{max} = 3\pi\pi 01^{-3}\,A$

* $I_{max} = \omega_0 Q_m$

* $Q_{max} = \frac{I_m}{\omega_0} = \frac{3\pi.10^{-3}}{250\pi}$

$\underline{Q_{max} = 12.10^{-6}\,C.}$

Remarque : Relation indépendante du temps entre **i** et **q**.

$q = Q_{max}\sin(\omega_0 t + \varphi_q)$

$i = Q_{max}\omega_0\cos(\omega_0 t + \varphi_q)$

$\sin(\omega_0 t + \varphi_q) = \frac{q}{Q_{max}}$

$\cos(\omega_0 t + \varphi_q) = \frac{1}{Q_{max}\omega_0}$

$1 = \frac{q^2}{Q_m^2} + \frac{i^2}{Q_m^2\omega_0^2}$

$Q_m^2 = q^2 + \frac{i^2}{\omega_0^2} \Rightarrow \frac{i^2}{\omega_0^2} = Q_m^2.q^2$

$\Rightarrow i^2 = \omega_0^2(Q_n^2.q^2)$

$i = \pm\omega_0\sqrt{Q_m^2.q^2}$